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POPULATION, HEALTH, AND ENVIRONMENT AS A BIODIVERSITY CONSERVATION STRATEGIC APPROACH

A synthesis of evidence

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Front Cover: Margarida Muanatraca a nurse, walks to work at the Nihessiua Health Centre in Nampula, Mozambique. © 2017 Kate Hold, Maternal and Child Survival Program

Back Cover: A woman from a rural area in South Africa carries firewood home. © 1997 Elizabeth Cecelski, courtesy of Photoshare

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ACRONYMS

BALANCED	Building Actors and Leaders for Advancing Community Excellence in Development
E3	Bureau for Economic Growth, Education, and Environment
FAB	Office of Forestry and Biodiversity
PHE	Population, Health, and Environment
USAID	United States Agency for International Development

INTRODUCTION

Increased understanding about the interdependence of environmental conditions and human health outcomes has prompted interest in integrated programs designed to produce benefits for both health and biodiversity conservation (see Key Resource 1). Among them, Population, Health, and Environment (PHE) strategic approaches aim to simultaneously improve access to health services and help communities manage natural resources in ways that allow them to improve their livelihoods and conserve biodiversity. Learning from the implementation of integrated conservation and development programs, PHE has aimed to be more targeted in the pursuit of its development objectives while remaining an integrated approach (Honzak and Oglethorpe 2011). The United States Agency for International Development (USAID) has been a strong supporter of PHE activities for over two decades (Pielemeier, Hunter, and Layng 2007), as have other major international and private donors (Pielemeier 2005). USAID's Office of Population/Reproductive Health established a Population-Environment program as a response to the FY02 Foreign Operations Appropriations Act, which allocated funds for family planning and reproductive health "in areas where population growth threatens biodiversity or endangered species."[1]

There is no single distinct PHE strategic approach. Instead, several definitions of PHE exist (The BALANCED Project 2013), and there is a great diversity of strategic approaches that fall under the PHE umbrella. PHE activities incorporate a variety of general and reproductive health, voluntary family planning, natural resource management, and biodiversity conservation objectives and actions.

Many causal pathways have been proposed to link PHE and biodiversity conservation goals (see PHE Causal Pathways section below). Generally, PHE intends to reduce threats to biodiversity (such as decreasing the demand for natural resources from expanding populations), promote greater buy-in and participation in conservation activities, and increase the efficiency of conservation activities. PHE proponents claim that it can lead to greater improvements in the condition of biodiversity focal interests than would be possible through single-sector interventions.

This report supports the Health and Biodiversity Integration Working Group in USAID's Office of Forestry and Biodiversity/Bureau for Economic Growth, Education, and Environment (E3/FAB) in its effort to strengthen the evidence base about integrated programming. In response to a request from the Working Group, this report synthesizes the evidence around three distinct topics. First, the report summarizes the main causal pathways assumed to link PHE projects

KEY RESOURCE 1

"AN OUNCE OF PREVENTION: MAKING THE LINK BETWEEN HEALTH AND CONSERVATION"

This report outlines conceptual and operational linkages between health and conservation strategic approaches. The authors reviewed 34 PHE activities to analyze approaches, present key examples, document common observations, and provide recommendations on integrating health and conservation. This resource can help practitioners better understand the conditions under which health and biodiversity conservation can be successfully integrated.

[1] https://www.usaid.gov/sites/default/files/documents/1864/timeline_b.pdf

with their stated goals. Understanding these causal linkages can help improve program or activity design, and evaluate the feasibility of specific activities. Explicit articulation of these pathways can also help inform efforts to integrate biodiversity conservation with other development sectors. Second, the report provides a synthesis of the indicators used by PHE programs to assess their biodiversity conservation impacts. Carefully defined indicators can be used in monitoring, evaluation, and learning, and indicators used in past PHE projects can provide evidence about their effectiveness compared to single-sector programming. Third, the report summarizes major assumptions that underpin PHE activities. Understanding implicit and explicit assumptions can help teams assess the likelihood that a PHE project will achieve its intended biodiversity conservation goals. Finally, the report provides recommendations for improving biodiversity outcomes and monitoring for missions considering this strategic approach. It also highlights key resources that explore specific topics in detail.

The report synthesizes evidence from the peer-reviewed and grey literature, and focuses on the biodiversity aspects of PHE activities (Annex 1).

PHE CAUSAL PATHWAYS

The pathways connecting PHE strategic approaches with their goals include conceptual and operational linkages (Margoluis et al. 2001). Conceptual linkages generally refer to the bidirectional relationships between human health and environmental conditions. This includes the maintenance of health-related ecosystem services (e.g., the provision of wild medicinal plants) and using health strategic approaches to reduce threats to biodiversity (e.g., voluntary family planning is conceptually linked to biodiversity goals when human population growth is considered a threat to biodiversity). Conceptual linkages underpin the pathways under Models 1, 2, and 3 below. Operational linkages describe synergies that increase effectiveness in the use of financial, logistical, technical, or human resources. Operational linkages can exist in the absence of conceptual linkages, and a specific PHE activity can include both linkage types (Margoluis et al. 2001).

Stem and Margoluis (2004) provided a comprehensive review of the causal linkages assumed to underpin PHE activities. They describe four main PHE implementation models (see Key Resource 2):

1. Health/population strategic approaches to achieve conservation outcomes
2. Conservation strategic approaches to achieve health/population outcomes
3. Conservation or health/population strategic approaches to achieve both conservation and health/population outcomes
4. Operational linkages to achieve health/population and/or conservation outcomes

Across these four models, Stem and Margoluis (2004) described 39 independent results chains to characterize common assumptions about how PHE strategic approaches lead to their stated outcomes. This report summarizes these results chains in Tables 1 - 4 below by listing the type of intervention, strategic approach, and a key intermediate result. Interested readers are encouraged to refer to the original report for further details about specific causal pathways. Readers should note that tables below describe higher-order generalized cause-effect pathways. That is, specific projects are likely to incorporate variations of these generalized causal pathways. It is beyond the scope of this report to collect, characterize, and report on every possible variation of stated or implied PHE causal linkages in the literature.

KEY RESOURCE 2

"CONVENTIONAL WISDOM ON CAUSAL LINKAGES AMONG POPULATION, HEALTH, AND ENVIRONMENT INTERVENTIONS AND TARGETS"

This report by Foundations of Success summarizes how various PHE strategic approaches are expected to lead to conservation and health outcomes. The authors compiled a list of the causal assumptions under which PHE practitioners operated when designing and implementing these approaches. The authors identified and articulated 39 separate results chains organized under four main models. The report also includes a list of indicators for each of the four models.

Table 1: *Health/population strategic approaches to achieve conservation outcomes*

Type of intervention	Strategic approach	Key intermediate result(s)
General health	Improving socio-economic situation	Reduced poverty leading to reduced demand for resources and less migration to environmentally fragile areas
General health	Improving livelihood options	Decreased use of environmentally destructive practices
General health	Improving livelihood options	Increased employment in environmentally friendly sectors leading to reduced resource use or extraction
General health	Addressing immediate community concerns	Increased concern for the environment leading to reduced resource use or extraction
Family planning and reproductive health	Decreasing fertility	Slower population growth or reduced family size leading to reduced resource use or extraction
Family planning and reproductive health	Decreasing fertility	Reduced family size leading to reduced clearing of new areas
Family planning and reproductive health	Decreasing fertility and improving nutrition	Reduced family size or increased space between births leading to more resources available, better nutrition, and better health (biodiversity outcomes are achieved through one or more of the linkages described in the *general health* interventions above)
Family planning and reproductive health	Empowering women	Improved natural resource management
Child survival	Reducing incentives to expand families	Fewer people to support leading to reduction migration to environmentally fragile areas
Child survival	Reducing incentives to expand families	Fewer people to support leading to reduction in resource use or extraction
Child survival	Reducing incentives to expand families	Improved child survival rates leading to improved health and/or nutrition (biodiversity outcomes are achieved through one or more of the linkages described in the *general health* interventions above)
Water and sanitation	Improving water quality	Reduced domestic waste reaching water bodies improves the quality of natural water bodies
Water and sanitation	Improving animal health	Reduced domestic waste reaching water bodies leads to improved wild animal health
Water and sanitation	Improving agricultural productivity	Increased water flows improving agricultural productivity, nutrition, and health (biodiversity outcomes are achieved through one or more of the linkages described in the *general health* interventions above)

Type of intervention	Strategic approach	Key intermediate result(s)
Water and sanitation	Reducing disease incidence	Improved hygiene reduces disease incidence (biodiversity outcomes are achieved through one or more of the linkages described in the *General health* interventions above)
Medicinal plant harvesting and cultivation	Reducing disease incidence	Improved health outcomes lead to better conservation
Malaria prevention	Improving water habitat	Reduced vector breeding sites improves natural water bodies
Malaria prevention	Reducing disease incidence	Reduced vector breeding leads to improved health outcomes and better conservation
HIV/AIDS interventions	Maintaining healthy populations of conservation workers and advocates	Reduced loss of conservation staff and advocates
Health intervention*	Reducing disease incidence	Improved health outcomes leading to better conservation

Table 2: *Conservation strategic approaches to achieve health outcomes*

Type of intervention	Strategic approach	Key intermediate result(s)
General conservation	Improving water quality	Reduced disease incidence leading to improved socio-economic status and more resources available for health care
General conservation	Improving water quantity	Improved agricultural yields leading to improved nutrition and/or improved socio-economic status and more resources available for health care
General conservation	Improving water quantity	Better hygiene leading to reduced disease incidence better and/or improved socio-economic status
General conservation	Improving land management	Improved agricultural yields leading to improved nutrition and/or improved socio-economic status and more resources available for health care
General conservation	Improving water (irrigation) management	Improved irrigation leading to reduction in disease vector breeding sites
General conservation	Protecting biodiversity	Sustainable resource harvesting leading to improved socio-economic status and more resources available for health care
General conservation	Protecting biodiversity	Increased availability of traditional medicine
General conservation	Protecting biodiversity	Increased availability of wild foods

Table 3: *Conservation or health/population strategic approaches to achieve both conservation and health/population outcomes*

Type of intervention	Strategic approach	Key intermediate result(s)
Water and sanitation	Reducing disease incidence in humans and improving animal health	Improved water quality leading to better human and animal health (biodiversity outcomes are achieved through one or more of the linkages described in the *General health* interventions in Model 1)
Water and sanitation	Improving water quality and reducing disease incidence	Reducing domestic waste in water bodies improves natural water bodies and human health. Links to conservation
Medicinal plants	Raising environmental awareness and treating/preventing human disease	Increased availability and awareness of traditional medicine leading to better health and increased concern for the environment
Health intervention*	Preventing human-animal disease transmission	Reduced disease incidence improves human health and disease transmission to animals
Health intervention*	Preventing human-animal disease transmission	Reduced disease incidence improves human health and disease transmission to animals

** Stem and Margoluis (2004) used "malaria" or "HIV/AIDS" interventions to describe these interventions. The language in this report is meant to reflect that PHE activities have included general health strategic approaches that can lead to the same results and goals but are not exclusively focused on malaria and/or HIV/AIDS.*

Table 4: *Operational linkages*

Type of intervention	Strategic approach	Key intermediate result(s)
Operational linkages	Sharing program expenses	Reduced operational costs leading to more people participating in population, health, and/or environment activities
Operational linkages	Expanding target audience	Expanded program reach leading to more people participating in population, health, and/or environment activities
Operational linkages	Improving communication	Improved partner coordination and collaboration leading to more people participating in population, health, and/or environment activities
Operational linkages	Building trust	Addressing community needs leads to greater acceptance of conservation activities
Operational linkages	Quid pro quo exchange	Greater participation in conservation activities

PHE INDICATORS FOR BIODIVERSITY CONSERVATION GOALS

This report summarizes indicators used within PHE activities and focused exclusively on indicators associated with biodiversity conservation goals. Two main findings are apparent: first, PHE activities generally use standard biodiversity indicators (Table 5). Second, the use of biodiversity indicators is not widespread across PHE activities, even when environmental impacts are a key component of their overall objectives.

***Table 5**: Illustrative table with standard indicators used in biodiversity conservation components of PHE activities*

Domain	Examples
Changes in condition of species/ecosystems of interest	Coral number, density, and biomass; area reforested; wildlife disease prevalence
Changes in ecosystem productivity or resource availability	Catch per unit effort
Changes in protected area networks	Protected area establishment, staff training
Perceptions, attitudes, knowledge	Knowledge of biodiversity loss as effect of slash and burn agriculture
Resource use	Household firewood consumption
Threat reduction	Number of households with full time fishers
Involvement in conservation action	Number of people participating in community conservation organizations
Progress of conservation activities	Number of tree nurseries established

As an illustration, Figure 2 uses data from Yavinsky et al. (2015) to aggregate information about the use of indicators per sector as well as any indicator used to track the benefits of integration across 42 PHE activities. All activities in this dataset included at least one population indicator and most (88%) included at least one health indicator. However, only half included an environment indicator. Despite claims about the benefits of integration, most activities in this sample (over 60%) did not include indicators specifically designed to assess the impacts of integration. Table 6 on page 11 shows an illustrative list of PHE integration indicators.

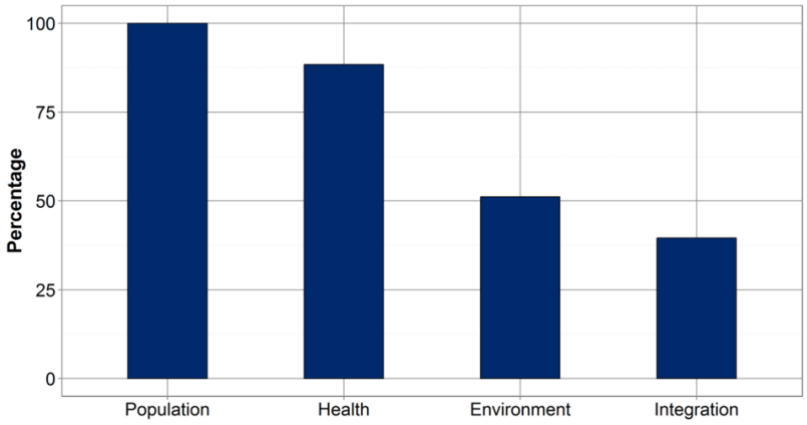

***Figure 1**: Percentage of PHE activities using at least one population, health, environment, or integration indicator. The figure uses information from 42 PHE activities from Yavinsky et al. (2015).*

Table 6: *Illustrative list of integration indicators used by PHE activities. Community-based distributors are local people trained to provide information on PHE or voluntary family planning methods or stock and sale voluntary family planning commodities.*

Integration indicators
Number of fisheries and/or protected area networks that serve as local community-based distributor suppliers
Number of environmental leaders (e.g., protected area managers) who are community-based distributors
Number of integrated messages/materials created
Number of policy-makers knowledgeable about or aware of specific PHE issue
Number of local policies/ordinances/plans that integrate PHE
Number of new PHE partnerships created that link organizations or institutions from different sectors
Number of protected area management plans formulated using multi-sectoral representation
Number of protected area management bodies that include representatives from women, youth, fisher folk, indigenous persons, or other marginalized groups
Number of partnerships established between environmental and population organizations

There are important challenges in assessing the impacts of PHE activities on biodiversity outcomes. For example, Yavinsky et al. (2015) suggest that such challenges include: (1) the interdisciplinary nature of integrated programs, which often results in implementing partners becoming responsible for tracking progress in activities that are beyond their area of expertise (e.g., a reproductive health organization having to track progress and impacts in biodiversity conservation strategic approaches); (2) results from different sectors do not necessarily become apparent in the same timescales (e.g., vaccination campaigns will produce measurable results more quickly than a reforestation project); and (3) the value of integration can be difficult to measure (see Key Resource 3).

KEY RESOURCE 3

"A GUIDE FOR MONITORING AND EVALUATING PHE PROGRAMS"
Developed by MEASURE Evaluation, this guide contains technical information for developing monitoring and evaluation plans as well as 65 recommended indicators. Each of the indicators listed contains a description, a time frame, data sources, collection considerations, and strengths and weaknesses. This guide can be useful to those designing PHE monitoring and evaluation protocols.

COMMON ASSUMPTIONS IN PHE ACTIVITIES

Explicit mentions of key assumptions along causal pathways or assessments of the evidence supporting key assumptions were scarce in the documents reviewed, but this could be an artifact of the search strategy implemented for this synthesis. However it was possible to identify several important assumptions common to many PHE activities by examining implied or explicit causal linkages. This report does not comment on the validity, relevance, or generality of each of the assumptions listed. Implementers of PHE activities would benefit from assessing the relevance and level of evidentiary support of their strategic approaches' main assumptions.

OVERARCHING ASSUMPTIONS

The benefits of PHE are in large part dependent on the assumption that integration of population, health, and environment goals is preferable over single-sector programming. At least one of the following assumptions needs to be true in the context in which PHE programming is or will take place for:

1. Integration allows for greater effectiveness, acceptance, reach, and/or sustainability than would be possible through single-sector strategic approaches.
2. Providing access to voluntary family planning and health services is an effective strategy for achieving biodiversity conservation outcomes either:
    a. Directly, by reducing threats such as population pressure or pathogen spillover; or
    b. Indirectly, by increasing the likelihood of achieving conservation goals through fostering goodwill and trust.

DEMOGRAPHIC ASSUMPTIONS

Many PHE activities assume that local population pressure is one of the main threats to local biodiversity, and therefore that access to voluntary family planning/reproductive health services can reduce that threat.

PHE activities that aim at reducing population size assume that their strategic approaches will produce meaningful long-term impacts on fertility rate that will be sufficient to change demographic trajectories at their sites. This report did not identify any PHE activities that included a target fertility rate, and most activities implicitly assumed that any reduction in said rate will contribute to achieving their overall environmental goals.

Generally, PHE strategic approaches with a demographic component make assumptions about:

1. *The magnitude of the reductions in fertility rate:* Significantly reducing population size requires substantial and sustained reductions in the total fertility rate. A key assumption is that voluntary family planning/reproductive health strategic approaches will be adequate to achieve such meaningful reductions in the specific contexts in which they are implemented.
2. *The temporal scale of the strategic approach and the observable results*: A common assumption is that the voluntary family planning/reproductive health strategic approaches will be sustained for a period that is sufficient to produce meaningful

demographic effects. It is also assumed that they will be effective as a conservation strategic approach even when the demographic impacts can only be expected in years or decades.

3. *The role of access to voluntary family planning in reducing total fertility*: A critical assumption is that access to voluntary family planning services will reduce fertility. This topic is under active debate in the academic literature, and it has been reported that in some developing countries, observed fertility declines are not primarily driven by voluntary family planning programs (Miller 2010).

Most PHE strategic approaches focus on intrinsic fertility rates as the main determinant of population size, which creates an implicit assumption about the relative relevance of other factors (i.e., migration and mortality). Most PHE strategic approaches do not discuss the potential role of immigration but some include an assumption about the role of migration by expecting that healthier and better educated children will emigrate to less environmentally sensitive areas (Honzak and Oglethorpe 2011). That is, net emigration is a key assumption in some PHE strategic approaches, and net immigration is not commonly considered by activities that aim to reduce population size.

The conceptual linkages between population size and conservation targets are dependent on the assumption that the need for natural resources will decline if population size is reduced. This in turn requires that per capita resource use will not increase, even if socioeconomic conditions in the target communities improve. Further, some strategic approaches assume that improving socioeconomic conditions will drive significant reductions on the demand for natural resources (see Model 1 on page 7).

ASSUMPTIONS ABOUT RESOURCE ALLOCATION

PHE activities often make assumptions about the allocation of additional resources expected to become available to participants. In some cases, achieving overall goals depends on specific expectations about the allocation of time and monetary resources. For example, it is assumed that smaller, healthier families, and better birth spacing lead to increases in women's time for other tasks; this additional time is assumed will be spent in conservation or natural resource management work (The BALANCED Project 2013).

Some strategic approaches assume that they will produce additional economic resources which will be invested in children's education. This is assumed to then result in eventual emigration from environmentally fragile areas and/or employment in environmentally sustainable activities.

ASSUMPTIONS ABOUT CONSTITUENCIES

Some PHE activities assume that integrated messaging is a more effective way to build constituencies and foster behavior change. Messages about biodiversity conservation and natural resource management targeting women, men, and/or youth are assumed to be more effectively communicated when delivered in the context of messages about health/family planning. For example, some projects assume that community members will more readily accept a project that addresses health or family planning needs than one that focuses exclusively

on biodiversity conservation. Others assume that men will be initially receptive to natural resource management or livelihoods messages and that this will provide an opportunity to deliver messages about voluntary family planning and health. Conversely, some projects assume that women will be more likely to participate in the project's conservation activities if they are integrated with the family planning and health messages.

Many activities assume that greater participation of women in conservation and natural resource management increases the likelihood that these activities will be successful. Similarly, some PHE strategic approaches target youth on the assumption that they are more receptive to new ideas and more likely to engage in biodiversity conservation action. Finally, some projects assume that targeting youth with integrated voluntary family planning and conservation messages will produce greater benefits than if they focused on the general population.

ASSUMPTIONS ABOUT THREATS

PHE strategic approaches are assumed to effectively match actions to threats. For example, a common PHE strategic approach is the provision of energy-efficient cook stoves to reduce the need for fuelwood, thereby reducing deforestation rates. A key assumption is that local household fuelwood use is the primary driver of deforestation and fuelwood collection. Similarly, many PHE strategic approaches assume that rural population growth is a main driver of forest loss, which may not be true in most regions (DeFries et al. 2010).

RECOMMENDATIONS

PHE AS A BIODIVERSITY CONSERVATION STRATEGIC APPROACH

When considering investments in PHE for biodiversity conservation, practitioners and donors should carefully consider the potential conceptual and operational linkages between population, health, and environment goals in their specific contexts. Formulating situation models and theories of change can guide practitioners and donors in identifying, explicitly stating, and assessing the causal linkages and key assumptions that underpin specific PHE strategic approaches (see Key Resource 4). For detailed guidance on this topic, users can refer to USAID's *Biodiversity How-To Guide 1: Developing Situation Models in USAID Biodiversity Programming* and *Biodiversity How-To Guide 2: Using Results Chains to Depict Theories of Change in USAID Biodiversity Programming*.

KEY RESOURCE 4

USAID BIODIVERSITY HOW-TO GUIDES.
These three guides are designed to help design teams, program managers, and implementing partners systematically approach biodiversity conservation design, planning, monitoring, evaluation, and learning within USAID's Program Cycle, as well as in compliance with the Automated Directives System (ADS) 201, Biodiversity Policy and the updated Biodiversity Code. *How-To Guide 1* describes situation models, which are visual representations of a problem or context. *How-To Guide 2* describes the use of results chains to depict theories of change, which are visual representations of logical causal relationships among a strategic approach and multiple levels of conditions or preliminary results needed to achieve a long-term result. *How-To Guide 3* explains how use results chains to articulate outcome statements and develop indicators for monitoring, evaluation, and learning.

PHE activities often make implicit and explicit assumptions that are reflected in design and implementation choices. The validity of these assumptions ultimately affects the likelihood of achieving biodiversity conservation goals. Teams should identify, explicitly state, and assess the validity of key assumptions. For detailed guidance on this topic, users can refer to Chapter 2 of the *USAID Biodiversity and Development Handbook* and USAID's *Biodiversity How-To Guide 3: Defining Outcomes and Indicators for Monitoring, Evaluation, and Learning in USAID Biodiversity Programming*.

Staff should use the best available evidence to inform their programmatic decisions (see Key Resource 5). There is a large body of literature, including peer-reviewed and grey sources, documenting different aspects of design, implementation, and impact assessment of PHE strategic approaches. Key resources are listed in text boxes and additional sources are included in the reference list. For additional guidance on using evidence, users can refer to USAID's brief on Identifying and Using Evidence in Biodiversity Programming.

KEY RESOURCE 5

***"KNOWLEDGE FOR HEALTH"* (k4health.org)**
K4Health is a USAID knowledge management project that seeks to encourage and enable health program managers and practitioners to collaborate and adapt through knowledge sharing. The K4Health website is a curated knowledge source that includes online learning courses, toolkits, multimedia resources, and reports. K4Health.org includes a PHE Toolkit, a compilation of resources and tools on several aspects of PHE strategic approaches.

MONITORING AND EVALUATION, AND BUILDING THE EVIDENCE BASE

Strategic approaches should incorporate robust project design, implementation, and monitoring and evaluation practices. Specifically, practitioners and donors should:

1. Develop systematic monitoring and evaluation protocols, and ensure that they are adhered to and that results are analyzed and interpreted.
2. Carefully define outcome assessment protocols and choose appropriate indicators. Standard sectoral indicators may not be sufficient to assess the impacts of multi-sectoral strategic approaches.
3. Define control groups that allow for meaningful comparisons.

Standard indicators are used to track progress towards biodiversity conservation goals and a large fraction of PHE strategic approaches do not report on any conservation indicators. Systematic assessments of the value of PHE as a biodiversity conservation strategic approach requires careful monitoring of its contributions to improving biophysical conditions. Practitioners and donors should identify a set of adequate indicators for biodiversity conservation based on robust theories of change.

PHE monitoring and evaluation frameworks should include metrics specifically designed to assess the impacts of integration. Simply using standard sectoral indicators for population, health, and environment is unlikely to generate credible and relevant evidence about the benefits of integration (see Annex 2 on Evidence Supporting Benefits of Integration). A detailed exploration of indicators for PHE activities, including specific indicators for integration, was produced by Finn (2007) for MEASURE Evaluation.

Important knowledge gaps remain about PHE as a biodiversity conservation strategic approach. Specifically, although some PHE projects have produced biodiversity conservation benefits, relatively little is known about best practices or the conditions that facilitate conservation outcomes. Additionally, there is a need for more robust evidence with which to document impacts and inform future program design. Among them, the evidence supporting the benefits of integration is still mixed (see Annex 2), but would be particularly useful for informing programmatic decisions. Practitioners and donors should strive to generate robust evidence about the impacts of integration. Specific aspects in need of systematically collected evidence:

1. All the advantages of PHE including the direction and magnitude of the operational impacts of integration.
2. The potential disadvantages and tradeoffs of integration.
3. The contributions of PHE activities to building trust and goodwill in favor of biodiversity conservation actions.

Implementers should assess the feasibility, acceptability, and effectiveness of the different PHE models to understand what works, what does not, and why. Few comparisons between outcomes of integrated and non-integrated services exist but this type of comparison would be particularly useful (FHI 360 2014, D'Agnes et al. 2010).

ANNEX 1: METHODS

This synthesis was based on a review of peer-reviewed and grey literature. An initial search was carried out using the Science Citation Index, Google Scholar, and USAID's Development Experience Clearinghouse. Additional references were added using a snowball approach. This was not an exhaustive or systematic review of the literature; instead, the research team reviewed an illustrative collection of published sources.

To summarize the causal pathways linking PHE strategic approaches with their stated goals, this synthesis focused on a review by Stem and Margoluis (2004). The pathways in Stem and Margoluis (2004) were compared to those stated or implied in the review of other PHE documents. Most of the documents reviewed were based on pathways that conformed to the general results chains in Stem and Margoluis (2004); when changes to Stem and Margoluis were included in this document, they are marked in the corresponding tables.

The sources included in the synthesis were analyzed to extract all indicators related to biodiversity goals. This report does not include a detailed list of all the indicators collected during the analysis. Instead, a list illustrating the types of biodiversity conservation indicators commonly found in PHE activities is included in the PHE Indicators for Biodiversity Conservation Goals section on page 11. Data from Yavinsky et al. (2015) were analyzed to investigate use of indicators in their sample of projects.

ANNEX 2: EVIDENCE SUPPORTING THE BENEFITS OF PHE INTEGRATION

This synthesis found that the PHE literature contains contrasting views regarding the evidence supporting the benefits of integration. On one hand, PHE proponents claim that significant benefits of integration have been demonstrated globally and that it has been shown to be both more effective and sustainable than single-sector strategic approaches (Sinaga et al. 2015). On the other hand, several sources report that the evidence for the benefits of the integrated approach and for the impacts of PHE projects is limited (see Key Resource 6). For example, a study reviewing PHE programming funded by the Packard Foundation and USAID concluded that there was no "conclusive evidence that PE [population environment] or PHE projects are always more effective than single-sectoral projects" (Pielemeier 2005). Sources also point out that PHE activities frequently fail to document and adequately monitor the benefits of integration or employ methods that would allow to test for differences between integrated and non-integrated strategic approaches (Pielemeier 2005, Hahn, Anandaraja, and D'Agnes 2011, Yavinsky et al. 2015).

KEY RESOURCE 6

"THE IMPACT OF POPULATION, HEALTH, AND ENVIRONMENT PROJECTS: A SYNTHESIS OF THE EVIDENCE"

This report by Yavinsky et al. (2015) analyses findings across 35 projects implemented from 1992 to 2010 that integrated voluntary family planning with environment, livelihoods, natural resource management, and other non-health development sectors. These projects were examined to synthesize monitoring and evaluation practices, the added value of integrated programming, current evidence in the field, gaps in evidence, and the successes and challenges in evidence collection.

The available evidence around the provision of co-benefits is scarce and has not been collected with sufficient frequency and rigor to reliably characterize the full magnitude of the impacts or the conditions associated with successful implementation of PHE activities. In general, the impacts of PHE investments on the environment have not been as adequately documented as those in voluntary family planning, despite long standing calls for increasing the documentation of the benefits of integration (Yavinsky et al. 2015). However, the available evidence suggests that integration can be beneficial for both implementers and beneficiaries (Yavinsky et al. 2015).

Documenting the benefits of integration can be a challenging task. It requires developing specialized indicators and applying robust protocols to clearly link cause and effect relationships. D'Agnes et al. (2010) used a quasi-experimental evaluation design to assess the benefits of integrating PHE in the Integrated Population and Coastal Resource Management activity in the Philippines. They defined three comparison groups (integrated coastal resource management and reproductive health, coastal resource management only, and reproductive health only) and collected data on 22 indicators before and after standardized interventions. Biophysical and demographic data were collected by independent research teams and statistically analyzed by the study's authors. The study concluded that the integrated strategic approach significantly outperformed the single-sector activities in all reproductive health and

food security and in three out of seven coastal resource management indicators. This kind of study is as rare in PHE as in other integrated development activities.

In practice, monitoring the effectiveness of integrated programs often requires implementing partners in one sector to collect and analyze data from another. Ideally, experimental or quasi-experimental studies would compare a number of integrated and single-sector strategic approaches while controlling for relevant social, economic, demographic, and ecological factors, and after establishing credible baselines for key well-designed indicators.

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